PA NT COOPERATION TREAT

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark Office, PCT
2011 South Clark Place Room CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 11 May 2001 (11.05.01)	
International application No. PCT/EP00/08884	**Applicant's or agent's file reference** 402582WO
International filing date (day/month/year) 08 September 2000 (08.09.00)	**Priority date** (day/month/year) 15 September 1999 (15.09.99)
Applicant BEERENDS, John, Gerard	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

02 February 2001 (02.02.01)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Pascal Piriou
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

Form PCT/IB/331 (July 1992)

BEST AVAILABLE COPY

PATENT COOPERATION TREA

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

KLEIN, Bart
KONINKLIJKE KPN N.V.
P.O. Box 95321
2509 CH Den Haag
PAYS-BAS

PCT

NOTIFICATION OF RECEIPT OF DEMAND BY COMPETENT INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

(PCT Rules 59.3(e) and 61.1(b), first sentence and Administrative Instructions, Section 601(a))

Applicant's or agent's file reference: 402582WO	Date of mailing (day/month/year): -8. 03. 01
	IMPORTANT NOTIFICATION

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/EP 00/ 08884	08/09/2000	15/09/1999

Applicant: KONINKLIJKE KPN N.V. et al.

1. The applicant is hereby **notified** that this International Preliminary Examining Authority considers the following date as the date of receipt of the demand for international preliminary examination of the international application:

02/02/2001

2. This date of receipt is:

☒ the actual date of receipt of the demand by this Authority (Rule 61.1(b)).

☐ the actual date of receipt of the demand on behalf of this Authority (Rule 59.3(e)).

☐ the date on which this Authority has, in response to the invitation to correct defects in the demand (Form PCT/IPEA/404), received the required corrections.

3. ☐ **ATTENTION:** That date of receipt is **AFTER** the expiration of 19 months from the priority date. Consequently, the election(s) made in the demand does (do) not have the effect of postponing the entry into the national phase until 30 months from the priority date (or later in some Offices) (Article 39(1)). Therefore, the acts for entry into the national phase must be performed within 20 months from the priority date (or later in some Offices) (Article 22). For details, see the *PCT Applicant's Guide*, Volume II.

☐ *(If applicable)* This notification confirms the information given by telephone, facsimile transmission or in person on: _____

4. Only where paragraph 3 applies, a copy of this notification has been sent to the International Bureau.

Name and mailing address of the IPEA/	Authorized officer
European Patent Office D-80298 Munich Tel. (+49-89) 2399-0, Tx: 523656 epmu d Fax: (+49-89) 2399-4465	LODOLO F Tel. (+49-89) 2399-2039

EUROPÄISCHES PATENTAMT · EUROPEAN PATENT OFFICE · OFFICE EUROPÉEN DES BREVETS

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

KLEIN, Bart
KONINKLIJKE KPN N.V.
Intellectual Property Group
P.O. Box 95321
2509 CH Den Haag
PAYS-BAS

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing *(day/month/year)*	12.12.2001
Applicant's or agent's file reference: 402582WO	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP00/08884	08/09/2000	15/09/1999

Applicant
KONINKLIJKE KPN N.V. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/	Authorized officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Poquet Oliver, R Tel.+49 89 2399-2911

Form PCT/IPEA/416 (July 1992)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
402582WO		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP00/08884	08/09/2000	15/09/1999
International Patent Classification (IPC) or national classification and IPC H04B3/46		
Applicant KONINKLIJKE KPN N.V. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
02/02/2001	12.12.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Ciccarese, C Telephone No. +49 89 2399 7302

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/08884

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-8 as originally filed

Claims, No.:

1-20 as received on 25/10/2001 with letter of 22/10/2001

Drawings, sheets:

1/2,2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-20
	No:	Claims
Inventive step (IS)	Yes:	Claims 1-20
	No:	Claims
Industrial applicability (IA)	Yes:	Claims 1-20
	No:	Claims

2. Citations and explanations
see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The application belongs to the field of signal processing for telecommunication networks. The goal is to obtain an estimation of the communication quality.

2. Claims 1, 12 and 17 are regarded as novel and inventive (Articles 33 (2)-(3) PCT) for the following reasoning:

an estimation of the link quality is obtained, said estimation being based on an evaluation of the effect of the echo of the signal coming from a talker *on the side of the talker himself/herself* (see page 2, line 37 to page 3, line 2: "returned signals").

Document D1= WO 94 00922 A analyses the quality of a signal which goes though e.g. a telephone line, by giving an estimation of the effect of the interferences on the *receiver's* perception. D1 focuses on the loss of quality of a signal due to the fact that it goes *through* a system. It analyses the differences between two signals X and Y which should ideally be as close as possible to each other. The device defined in D1 is therefore not useful to the purposes defined in the application.

3. Amended claims: Based on original claims:

1	1
12	12
17	12, 17

4. The dependent claims concern advantageous embodiments of the subject

matter of the independent claims and thus their subject matter is also considered to be novel and inventive.

F. CLAIMS

REPLACED BY ART 34 AMDT

1. Method for measuring a talking quality of a telephone link in a telecommunications network,
characterised by the following steps:
- combining, by means of combining means (34), a talker speech signal (s(t)) and a corresponding returned signal (r(t)) to a combined speech signal (s'(t)), the returned signal being a signal which occurred in a return channel of the telephone link as a consequence of the transmission of the talker speech signal in a forward channel of the telephone link, and
- subjecting the combined speech signal with respect to the talker speech signal to an objective measurement technique (32) for measuring a perceptual quality of speech signals, and
- producing an output signal (q(t)) which represents an estimated value concerning the talking quality.

2. Method according to claim 1, characterised in that the combining step comprises a signal addition of the returned signal and the talker speech signal in the electrical domain.

3. Method according to claim 2, characterised in that the signal addition is preceded by an inverse filtering of either the returned signal, or the talker speech signal.

4. Method according to claim 2 or 3, characterised in that the returned signal (e4) is taken off from a two-wire part (23) of the telephone link.

5. Method according to claim 2 or 3, characterised in that the returned signal (e2, e3) is taken off from a four-wire part (28) of the telephone link.

6. Method according to claim 1, characterised in the combining step comprises a signal combination of the returned signal and the talker speech signal in the acoustical domain.

7. Method according to claim 6, characterised in that the talker speech signal (s) and the returned signal (e5) are combined by means

or a microphone, which is additional to the microphone in a telephone set (21) and located near an ear of a talking user of the telephone set.

8. Method according to any of the claims 1,-,7, characterised in that the talker speech signal and the returned signal are taken off from an established telephone link.

9. Method according to claim 8, characterised in that the produced output signal of the objective measurement (42) is fed to a control input (52) of an echo-minimising device (46) included in the established telephone link.

10. Method according to claim 9, characterised in that the output signal of the objective measurement is fed to a monitoring system (F, G).

11. Method according to any of the claims 1,-,7, characterised in that the talker speech signal, and either the combined signal or the returned signal are signals laid down in a data base.

12. Device for measuring a talking quality of a telephone link in a telecommunications network (30; 40), the device comprising measurement means (32; 42) for an objective measuring of a perceptual quality of speech signals, the measuring means being provided with:

- a first input port (33; 47) for receiving a first speech signal (s(t); s) transmitted or to be transmitted via a forward channel of the telephone link,
- a second input port (35; 48) for receiving a second speech signal (s'(t); s'), which is a function of the first speech signal affected in the telecommunications network,
- an output port (36; 50) for an output signal representing an estimated value of the perceptual quality of the second speech signal with respect to the first speech signal,

characterised in that

the device additionally comprises signal combination means (34; 49) for combining the first speech signal (s(t); s) and a third speech signal (r(t); e), thereby generating the second speech signal (s'(t); s'), the first and third speech signal being a talker speech signal and a corresponding returned signal, respectively, the returned signal being a signal which occurred in a return channel (24, 28, 23; 45, 41)

of the telephone link as a consequence of the transmission of the talker speech signal in a forward channel (23, 27, 24; 41, 44) of the telephone link, and the output signal representing an estimated value concerning the talking quality.

13. Device according to claim 12, characterised in that the signal combination means comprise a signal adder.

14. Device according to claim 12 or 13, characterised in that the signal combination means (49) are provided with first (49.1) and second (49.2) signal inputs, which are coupled to the forward channel (44) and the return channel (45) of an established telephone link, respectively, and that the first input port (47) of the measurement means (42) is coupled to the forward channel, and the second input port (48) of the measurement means is coupled to the signal output of the signal-combination means (49).

15. Device according to claim 14, characterised in that the output port (50) is coupled to a control input (52) of an echo-minimising device (46) included in the established telephone link.

16. Device according to claim 12 or 13, characterised in that the first and the second input ports are coupled to a data base of speech signals, on which the first speech signal, and either the second speech signal or the echo signal, are laid down.

17. Telephone-link circuit for a telephone link in a telecommunications network, comprising a forward channel (41, 44) and a return channel (45, 41), and an echo-minimising device (46) included between the forward channel and the return channel, characterised in that

the telephone-link circuit further comprises:

- a signal combiner (49) provided with first and second signal inputs (49.1, 49.2), which are coupled to the forward channel (44) and the return channel (45) of a telephone link, respectively, and with a signal output (49.3), and
- an objective measurement device (42) provided with a first input port (47) coupled to the forward channel (44) and a second input port (48) coupled to the output (49.3) of the signal combiner (49), and an output port (50), for processing a first speech signal received on the first input port, and with a

second speech signal received on the second input port, and for producing an output signal on the output port.

18. Telephone-link circuit according to claim 17, characterised in that the output port (50) of the measurement device has a signal coupling with a control input (52) of the echo-minimising device (46).

19. Telephone-link circuit according to claim 17 or 18, characterised in that there is further provided for a detection device (53) for detecting the speech status over the established telephone link, and for a switch (51) included in the signal coupling with the control input (52), the switch being controlled by the detection device.

20. Telephone-link circuit according to any of the claims 17, 18 or 19, characterised in that the output port (50) of the measurement device has a signal coupling (F, G) with a monitoring system.

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

KLEIN, Bart
KONINKLIJKE KPN N.V.
P.O. Box 95321
2509 CH Den Haag
PAYS-BAS

T: 22-11-2001

PCT

WRITTEN OPINION

(PCT Rule 66)

Date of mailing *(day/month/year)*	12.10.2001
Applicant's or agent's file reference: 402582WO	**REPLY DUE** **within 1 month(s) and 20 days** from the above date of mailing

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP00/08884	08/09/2000	15/09/1999

International Patent Classification (IPC) or both national classification and IPC

H04B3/46

Applicant

KONINKLIJKE KPN N.V. et al.

1. This written opinion is the **first** drawn up by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

I	☒	Basis of the opinion
II	☐	Priority
III	☐	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	☐	Lack of unity of invention
V	☐	Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	☐	Certain document cited
VII	☐	Certain defects in the international application
VIII	☒	Certain observations on the international application

3. The applicant is hereby **invited to reply** to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4. For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis. For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 15/01/2002.

Name and mailing address of the international preliminary examining authority:

European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer / Examiner

Ciccarese, C

Formalities officer (incl. extension of time limits)

Teschauer, B

Telephone No. +49 89 2399 8231

I. Basis of the opinion

1. With regard to the **elements** of the international application (Replacement *sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"*):

Description, pages:

1-8 as originally filed

Claims, No.:

1-20 as originally filed

Drawings, sheets:

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item VIII

Certain observations on the international application

1. In the wording of claim 12, the definition of some of the signals are not clear: it seems that the text of present claim 12, page 2 of the claims, line 39 to page 3 of the claims, line 1 should read:

   ... the first and third speech signal being respectively a talker speech signal and a signal which occurred in a return Channel of the telephone link...

2. Claim 17 is not clear, since the output signal is not defined. It seems that, in order to make claim 17 clear, page 4 of the claims, line 2 should read:

   ... an output signal on the output port, said output signal representing an estimated value concerning of the talking quality.

3. The attention of the applicant is drawn to the fact that the application may not be amended in such a way that it contains subject matter which extends beyond the content of the application as filed (Article 34 (2) (b) PCT).

PC

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

Receiving Office use only

International Application No. PCT/EP 0 0 / 0 8 8 8 4

International Filing Date (08. 09. 2000) 08 SEP 2000

EUROPEAN PATENT OFFICE
PCT INTERNATIONAL APPLICATION
Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference *(if desired) (12 characters maximum)* 402582WO

Box No. I TITLE OF INVENTION

Measuring the perceptual quality of speech signals including echo disturbances

Box No. II APPLICANT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

KONINKLIJKE KPN N.V.
Stationsplein 7
9726 AE GRONINGEN
The Netherlands

☐ This person is also inventor.

Telephone No. +31 332 30 91

Facsimile No. +31 332 38 40

Teleprinter No.

State *(that is, country)* of nationality: NL

State *(that is, country)* of residence: NL

This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

BEERENDS
John Gerard
Polderweg 26
4585 PB HENGSTDIJK
The Netherlands

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: NL

State *(that is, country)* of residence: NL

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

KLEIN Bart
KONINKLIJKE KPN N.V.
P.O. BOX 95321
2509 CH THE HAGUE
The Netherlands

Telephone No. +31 70 332 30 91

Facsimile No. +31 70 332 38 40

Teleprinter No.

☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes; at least one must be marked)*:

Regional Patent

☒ **AP** **ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, MZ Mozambique, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT

☒ **EA** **Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT

☒ **EP** **European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT

☒ **OA** **OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT *(if other kind of protection or treatment desired, specify on dotted line)* .....

National Patent *(if other kind of protection or treatment desired, specify on dotted line)*:

☒ **AE** United Arab Emirates
☒ **AG** Antigua and Barbuda
☒ **AL** Albania .....
☒ **AM** Armenia .....
☒ **AT** Austria .....
☒ **AU** Australia .....
☒ **AZ** Azerbaijan
☒ **BA** Bosnia and Herzegovina .....
☒ **BB** Barbados
☒ **BG** Bulgaria .....
☒ **BR** Brazil .....
☒ **BY** Belarus .....
☒ **BZ** Belize
☒ **CA** Canada
☒ **CH and LI** Switzerland and Liechtenstein
☒ **CN** China .....
☒ **CR** Costa Rica .....
☒ **CU** Cuba .....
☒ **CZ** Czech Republic .....
☒ **DE** Germany .....
☒ **DK** Denmark .....
☒ **DM** Dominica
☒ **DZ** Algeria .....
☒ **EE** Estonia .....
☒ **ES** Spain .....
☒ **FI** Finland .....
☒ **GB** United Kingdom
☒ **GD** Grenada
☒ **GE** Georgia .....
☒ **GH** Ghana .....
☒ **GM** Gambia
☒ **HR** Croatia .....
☒ **HU** Hungary .....
☒ **ID** Indonesia
☒ **IL** Israel .....
☒ **IN** India .....
☒ **IS** Iceland
☒ **JP** Japan .....
☒ **KE** Kenya .....
☒ **KG** Kyrgyzstan .....
☒ **KP** Democratic People's Republic of Korea .....
☒ **KR** Republic of Korea .....
☒ **KZ** Kazakhstan .....
☒ **LC** Saint Lucia
☒ **LK** Sri Lanka
☒ **LR** Liberia
☒ **LS** Lesotho .....
☒ **LT** Lithuania
☒ **LU** Luxembourg
☒ **LV** Latvia
☒ **MA** Morocco .....
☒ **MD** Republic of Moldova .....
☒ **MG** Madagascar .....
☒ **MK** The former Yugoslav Republic of Macedonia .....
☒ **MN** Mongolia
☒ **MW** Malawi .....
☒ **MX** Mexico .....
☒ **MZ** Mozambique
☒ **NO** Norway
☒ **NZ** New Zealand .....
☒ **PL** Poland .....
☒ **PT** Portugal .....
☒ **RO** Romania
☒ **RU** Russian Federation .....
☒ **SD** Sudan
☒ **SE** Sweden
☒ **SG** Singapore
☒ **SI** Slovenia .....
☒ **SK** Slovakia .....
☒ **SL** Sierra Leone .....
☒ **TJ** Tajikistan .....
☒ **TM** Turkmenistan .....
☒ **TR** Turkey .....
☒ **TT** Trinidad and Tobago .....
☒ **TZ** United Republic of Tanzania
☒ **UA** Ukraine .....
☒ **UG** Uganda .....
☒ **US** United States of America .....
☒ **UZ** Uzbekistan .....
☒ **VN** Viet Nam .....
☒ **YU** Yugoslavia .....
☒ **ZA** South Africa .....
☒ **ZW** Zimbabwe .....

Check-box reserved for designating States which have become party to the PCT after issuance of this sheet:

☐ .....

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)*

Box No. VI PRIORITY CLAIM ☐ Further priority claims are indicated in the Supplemental Box.

Filing date of earlier application (day/month/year)	Number of earlier application	WI[redacted]rlier application is: national application: country	regional application:* regional Office	international application: receiving Office
item (1) (15/09/1999) 15 Sept. 1999	1013044	NL		
item (2)				
item (3)				

☐ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office)* identified above as item(s): _____

* *Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.*

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used)* : ISA/ EP

Request to use results of earlier search; reference to that search *(if an earlier search has been carried out by or requested from the International Searching Authority)*:

Date (day/month/year)	Number	Country (or regional Office)
14/06/2000	SN 33802	NL

Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following **number of sheets**:

request	:	4
description (excluding sequence listing part)	:	8
claims	:	4
abstract	:	1
drawings	:	2
sequence listing part of description	:	
Total number of sheets	:	19

This international application is **accompanied** by the item(s) marked below:

1. ☒ fee calculation sheet
2. ☒ separate signed power of attorney
3. ☒ copy of general power of attorney; reference number, if any:
4. ☐ statement explaining lack of signature
5. ☒ priority document(s) identified in Box No. VI as item(s):
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☒ other *(specify)*: search report

Figure of the drawings which should accompany the abstract: 3

Language of filing of the international application: English

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

KLEIN Bart

For receiving Office use only

1. Date of actual receipt of the purported international application: (08. 09. 2000) 08 SEP 2000
2. Drawings: ☒ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:
4. Date of timely receipt of the required corrections under PCT Article 11(2):
5. International Searching Authority (if two or more are competent): ISA/
6. ☐ Transmittal of search copy delayed until search fee is paid.

For International Bureau use only

Date of receipt of the record copy by the International Bureau:

Supplemental Box *If the Supplemental Box is not used, this sheet should not be included in the request.*

*1. If, in any of the Boxes, **the space is insufficient** to furnish all the information: in such case, write "Continuation of Box No. ..." [indicate the number of the Box] and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular:*

*(i) if **more than two persons are involved as applicants and/or inventors** and no "continuation sheet" is available: in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below;*

*(ii) if, in Box No. II or in any of the sub-boxes of Box No. III, the indication **"the States indicated in the Supplemental Box"** is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;*

*(iii) if, in Box No. II or in any of the sub-boxes of Box No. III, **the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America**: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;*

*(iv) if, in addition to the agent(s) indicated in Box No. IV, there are **further agents**: in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;*

*(v) if, in Box No. V, the name of any State (or OAPI) is accompanied by the indication **"patent of addition,"** or **"certificate of addition,"** or if, in Box No. V, the name of the United States of America is accompanied by an indication **"continuation"** or **"continuation-in-part"**: in such case, write "Continuation of Box No. V" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;*

*(vi) if, in Box No. VI, there are **more than three earlier applications whose priority is claimed**: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI;*

*(vii) if, in Box No. VI, **the earlier application is an ARIPO application**: in such case, write "Continuation of Box No. VI", specify the number of the item corresponding to that earlier application and indicate at least one country party to the Paris Convention for the Protection of Industrial Property or one Member of the World Trade Organization for which that earlier application was filed.*

*2. If, with regard to the **precautionary designation statement** contained in Box No. V, the applicant wishes to exclude any State(s) from the scope of that statement: in such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded.*

*3. If the applicant claims, in respect of any designated Office, the benefits of provisions of the national law concerning **non-prejudicial disclosures or exceptions to lack of novelty**: in such case, write "Statement concerning non-prejudicial disclosures or exceptions to lack of novelty" and furnish that statement below.*

BEERENDS
John Gerard

PCT

POWER OF ATTORNEY

(for an international application filed under the Patent Cooperation Treaty)

(PCT Rule 90.4)

The undersigned applicant(s) *(Names should be indicated as they appear in the request)*:

John Gerard BEERENDS

hereby appoints (appoint) the following person as: [x] agent [ ] common representative

Name and address
(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

KLEIN Bart
c/o KONINKLIJKE KPN N.V.
P.O. BOX 95321
2509 CH THE HAGUE
The Netherlands

to represent the undersigned before

[x] all the competent International Authorities
[ ] the International Searching Authority only
[ ] the International Preliminary Examining Authority only

in connection with the international application identified below:

Title of the invention:
Measuring the perceptual quality of speech signals including echo disturbances

Applicant's or agent's file reference: 402582WO

International application number (if already available):

filed with the following Office _____ as receiving Office
and to make or receive payments on behalf of the undersigned.

Signature of the applicant(s) *(where there are several applicants, each of them must sign; next to each signature, indicate the name of the person signing and the capacity in which the person signs, if such capacity is not obvious from reading the request or this power)*:

BEERENDS John Gerard

Date: August 8, 2000

This sheet is part of and does not count as a sheet of the international application.

PCT

FEE CALCULATION SHEET

Annex to the Request

For receiving Office use only

International application No.

Date stamp of the receiving Office

Applicant's or agent's file reference: 402582WO

Applicant: KONINKLIJKE KPN N.V.

CALCULATION OF PRESCRIBED FEES

1. **TRANSMITTAL FEE** . . . . . EUR 102 [T]

2. **SEARCH FEE** . . . . . EUR 945 [S]

International search to be carried out by _____

(If two or more International Searching Authorities are competent in relation to the international application, indicate the name of the Authority which is chosen to carry out the international search.)

3. **INTERNATIONAL FEE**

Basic Fee

The international application contains 19 sheets.

first 30 sheets . . . . . EUR 409 [b1]

_____ (remaining sheets) x 9 (additional amount) = _____ [b2]

Add amounts entered at b1 and b2 and enter total at B . . . . _____ [B]

Designation Fees

The international application contains 87 designations.

8 (number of designation fees payable *(maximum 8)*) x 88 (amount of designation fee) = EUR 704 [D]

Add amounts entered at B and D and enter total at I . . . . . _____ [I]

(Applicants from certain States are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the total to be entered at I is 25% of the sum of the amounts entered at B and D.)

4. **FEE FOR PRIORITY DOCUMENT** *(if applicable)* . . . . . _____ [P]

5. **TOTAL FEES PAYABLE** . . . . . _____

Add amounts entered at T, S, I and P, and enter total in the TOTAL box: TOTAL

[ ] The designation fees are not paid at this time.

MODE OF PAYMENT

- [x] authorization to charge deposit account (see below)
- [ ] bank draft
- [ ] coupons
- [ ] cheque
- [ ] cash
- [ ] other *(specify):*
- [ ] postal money order
- [ ] revenue stamps

DEPOSIT ACCOUNT AUTHORIZATION *(this mode of payment may not be available at all receiving Offices)*

The RO/ EP

- [x] is hereby authorized to charge the total fees indicated above to my deposit account.
- [x] *(this check-box may be marked only if the conditions for deposit accounts of the receiving Office so permit)* is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.
- [x] is hereby authorized to charge the fee for preparation and transmittal of the priority document to the International Bureau of WIPO to my deposit account.

Deposit Account No. _____ Date *(day/month/year)* _____ Signature Bart KLEIN

See Notes to the fee calculation she

PATENT COOPERATION TREATY

From the RECEIVING OFFICE

PCT

To:
KLEIN, Bart
KONINKLIJKE KPN N.V.
P.O. Box 95321
2509 CH Den Haag
PAYS-BAS

NOTIFICATION OF THE INTERNATIONAL APPLICATION NUMBER AND OF THE INTERNATIONAL FILING DATE

PCT/EP 00/08884
(PCT Rule 20.5(c))

Date of mailing *(day/month/year)*	01. 11. 2000
Applicant's or agent's file reference: 402582WO	IMPORTANT NOTIFICATION

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP 00/ 08884	08/09/2000	15/09/1999

Applicant: KONINKLIJKE KPN N.V.

Title of the invention:

1. The applicant is hereby notified that the international application has been accorded the international application number and the international filing date indicated above.
2. The applicant is further notified that the record copy of the international application was transmitted to the International Bureau on the above date of mailing.
3. ☐ Other:

* The International Bureau monitors the transmittal of the record copy by the receiving Office and will notify the applicant (with Form PCT/IB/301) of its receipt. Should the record copy not have been received by the expiration of 14 months from the priority date, the International Bureau will notify the applicant (Rule 22.1(c)).

Name and mailing address of the receiving Office	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	C. van Amstel

Form PCT/RO/105 (0792) P20402

The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ EP

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:
The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only

Identification of IPEA	Date of receipt of DEMAND

Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION

Applicant's or agent's file reference: 402582 WO

International application No.	International filing date *(day/month/year)*	(Earliest) Priority date *(day/month/year)*
PCT/EP00/08884	08 September 2000 (08/09/2000)	15 September 1999 (15/09/1999)

Title of invention

Measuring the perceptual quality of speech signals including echo disturbances.

Box No. II APPLICANT(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

KONINKLIJKE KPN N.V.
7 Stationsplein
9726 AE GRONINGEN
The Netherlands

Telephone No.: +31703323091
Facsimile No.: +31703323840
Teleprinter No.:

State *(that is, country)* of nationality: NL
State *(that is, country)* of residence: NL

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

BEERENDS, John Gerard
Polderweg 26
4585 PB HENGSTDIJK
The Netherlands

State *(that is, country)* of nationality: NL
State *(that is, country)* of residence: NL

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

State *(that is, country)* of nationality:
State *(that is, country)* of residence:

☐ Further applicants are indicated on a continuation sheet.

See Notes to the demand form

International application No.
PCT/EP00/08884

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The following person is [x] agent [ ] common representative

and [x] has been appointed earlier and represents the applicant(s) also for international preliminary examination.

[ ] is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.

[ ] is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

KLEIN, Bart
Koninklijke KPN N.V.
P.O. Box 95321
2509 CH THE HAGUE
The Netherlands

Telephone No.: +31703323091

Facsimile No.: +31703323840

Teleprinter No.:

[ ] **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special addr ess to which correspondence should be sent.

Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION

Statement concerning amendments:*

1. The applicant wishes the international preliminary examination **to start on the basis of:**

[x] the international application as originally filed

the description [x] as originally filed
[ ] as amended under Article 34

the claims [x] as originally filed
[ ] as amended under Article 19 (together with any accompanying statement)
[ ] as amended under Article 34

the drawings [x] as originally filed
[ ] as amended under Article 34

2. [ ] The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.

3. [ ] The applicant wishes the start of the international preliminary examination **to be postponed** until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: English

[x] which is the language in which the international application was filed.
[ ] which is the language of a translation furnished for the purposes of international search.
[ ] which is the language of publication of the international application.
[ ] which is the language of the translation (to be) furnished for the purposes of international preliminary examination.

Box No. V ELECTION OF STATES

The applicant hereby **elects all eligible States** *(that is, all States which have been designated and which are bound by Chapter II of the PCT)*

excluding the following States which the applicant wishes **not to elect:**

See Notes to the demand form

Sheet No. 3

International application No. PCT/EP00/08884

Box No. VI CHECK LIST

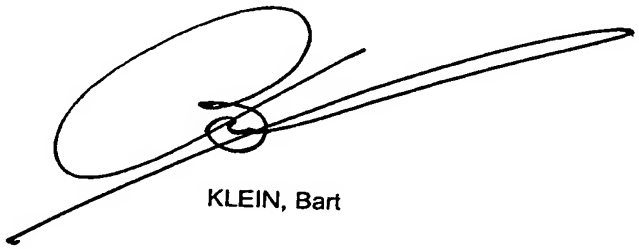
The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:			For International Preliminary Examining Authority use only: received	not received
1. translation of international application	:	sheets	☐	☐
2. amendments under Article 34	:	sheets	☐	☐
3. copy (or, where required, translation) of amendments under Article 19	:	sheets	☐	☐
4. copy (or, where required, translation) of statement under Article 19	:	sheets	☐	☐
5. letter	:	sheets	☐	☐
6. other *(specify)*	:	sheets	☐	☐

The demand is also accompanied by the item(s) marked below:

1. [x] fee calculation sheet
2. [ ] separate signed power of attorney
3. [x] copy of general power of attorney; reference number, if any:
4. [ ] statement explaining lack of signature
5. [ ] nucleotide and or amino acid sequence listing in computer readable form
6. [ ] other *(specify)*:

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).



KLEIN, Bart

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:
2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):
3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply. ☐ The applicant has been informed accordingly.
4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.
5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

PCT

CHAPTER II

FEE CALCULATION SHEET

Annex to the Demand for international preliminary examination

International application No.	PCT/EP00/08884
Applicant's or agent's file reference	402582WO

For International Preliminary Examining Authority use only

Date stamp of the IPEA

Applicant

KONINKLIJKE KPN N.V.

Calculation of prescribed fees

1. Preliminary examination fee	EUR 1533	P
2. Handling fee *(Applicants from certain States are entitled to a reduction of 75% of the handling fee. Where the applicant is (or all applicants are) so entitled, the amount to be entered at H is 25% of the handling fee.)*	EUR 147	H
3. Total of prescribed fees Add the amounts entered at P and H and enter total in the TOTAL box.....	EUR 1680	TOTAL

Mode of Payment

- [x] authorization to charge deposit account with the IPEA (see below)
- [ ] cheque
- [ ] postal money order
- [ ] bank draft
- [ ] cash
- [ ] revenue stamps
- [ ] coupons
- [ ] other *(specify)*:

Deposit Account Authorization *(this mode of payment may not be available at all IPEAs)*

The IPEA/ EP [x] is hereby authorized to charge the total fees indicated above to my deposit account.

[ ] *(this check-box may be marked only if the conditions for deposit accounts of the IPEA so permit)* is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.

28090011
Deposit Account Number

31 January 2001
Date *(day/month/year)*

Signature KLEIN, Bart

Form PCT/IPEA/401 (Annex) (July 1998; reprint July 2000)

See Notes to the fee calculation sheet

1 **ALLGEMEINE VOLLMACHT**
GENERAL AUTHORISATION
POUVOIR GENERAL

Kopie für den Bevollmächtigten
To be returned to authorisee
Copie destinée au mandataire

AV Nr. (bitte bei jeder Korrespondenz angeben)
GA No. (please quote in all correspondence)
PG n° (prière de mentionner dans toute correspondance)

21396 (re

2 Ich (Wir) / I (We) / Je (Nous)

Koninklijke KPN N.V.
Stationsplein 7
9726 AE GRONINGEN
The Netherlands

3 bevollmächtige(n) hiermit / do hereby authorise / autorise (autorisons) par la présente

the following employees of Koninklijke KPN N.V.

KLEIN Bart (Professional Representative)

KRUK Wiggert Johan (Professional Representative)

WUYTS Koenraad Maria (Professional Representative)

mailing address: Koninklijke KPN N.V.
Intellectual Property Group
P.O. Box 95321
2509 CH THE HAGUE
The Netherlands

4 mich (uns) in den durch das Europäische Patentübereinkommen geschaffenen Verfahren in allen meinen (unseren) Patentangelegenheiten zu vert
alle Handlungen für mich (uns) vorzunehmen und Zahlungen für mich (uns) in Empfang zu nehmen.
to represent me (us) in all proceedings established by the European Patent Convention and to act for me (us) in all patent transactions and to re
payments on my (our) behalf.
à me (nous) représenter pour ce qui concerne toutes mes (nos) affaires de brevet dans toute procédure instituée par la Convention sur le brevet eur
et, à ce titre, à agir en mon (notre) nom et à recevoir des paiements pour mon (notre) compte.

[x] Die Vollmacht gilt auch für Verfahren nach dem Vertrag über die internationale Zusammenarbeit auf dem Gebiet des Patentwesens.
This authorisation shall also apply to the same extent to any proceedings established by the Patent Cooperation Treaty.
Ce pouvoir s'applique également à toute procédure instituée par le Traité de coopération en matière de brevets.

[ ] Weitere Vertreter sind auf einem gesonderten Blatt angegeben. / Additional representatives indicated on supplementary sheet.
Les autres mandataires sont mentionnés sur une feuille supplémentaire.

5 [x] Untervollmacht kann erteilt werden. / Sub-authorisation may be given. / Le pouvoir pourra être délégué.

6 [x] Bitte die gelbe Kopie, ergänzt um die Nr. der allgemeinen Vollmacht, an den Vollmachtgeber zurücksenden.
Please return the yellow copy, supplemented by the General Authorisation No., to the authorisor.
Prière de renvoyer la copie jaune au mandant, munie du n° du pouvoir général.

Ort / Place / Lieu The Hague

Datum / Date June 06, 2000

Unterschrift(en) / Signature(s)

B. KLEIN (Head Intellectual Property Group)

7 Das Formblatt muß vom (von den) Vollmachtgeber(n) (bei juristischen Personen vom Unterschriftsberechtigten) eigenhändig unterzeichnet sein. Nach der Unterschrift bitte (die) Namen des (der) Unterzeichneten mit Schreibmaschine wiederholen (bei juristischen Personen die Stellung des Unterschriftsberechtigten innerhalb der Gesellsch angeben).

The form must bear the personal signature(s) of the authorisor(s) (in the case of legal persons, that of the officer empowered to sign). After the signature, please type the name of the signatory(ies) adding, in the case of legal persons, his (their) position within the company.

Le formulaire doit être signé de la propre main du (des) mandant(s) (dans le cas de personnes morales, de la personne ayant qualité pour signer). Veuillez ajouter à la machi après la signature, le (les) nom(s) du (des) signataire(s) en mentionnant, dans le cas de personnes morales, ses (leurs) fonctions au sein de la société.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
KONINKLIJKE KPN N.V.
Attn. KLEIN, Bart
P.O. Box 95321
2509 CH Den Haag
NETHERLANDS

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 402582WO	Date of mailing *(day/month/year)* 24/01/2001
International application No. PCT/EP 00/ 08884	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
Applicant KONINKLIJKE KPN N.V.	International filing date *(day/month/year)* 08/09/2000

1. [X] The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Fascimile No.: (41–22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules.90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, a demand for International preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within **20 months** from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority European Patent Office, P.B. 5818 Patentlaan 2 NL–2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Authorized officer Lisa O'Sullivan

Form PCT/ISA/220 (July 1998)

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

BNSDOCID: <XSISA220NOENP4_I_>

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped),whether

(i) the claim is unchanged;

(ii) the claim is cancelled;

(iii) the claim is new;

(iv) the claim replaces one or more claims as filed;

(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international appplication is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
402582WO		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/EP 00/ 08884	08/09/2000	15/09/1999
Applicant		
KONINKLIJKE KPN N.V.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 3

   [X] as suggested by the applicant.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PC[redacted] 00/08884

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04B3/46 H04B3/23

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, INSPEC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	WO 97 15124 A (ERICSSON TELEFON AB L M ;KARLSEN JOHNNY (SE); ERIKSSON ANDERS (SE)) 24 April 1997 (1997-04-24) abstract page 1, line 8 -page 2, line 18; figure 1 page 3, line 19 - line 27; figure 2 page 7, line 7 -page 8, line 12; claims 1,2; figure 4 ---	1-6, 11-13, 16-18 7,8,14, 19,20
Y	WO 94 00922 A (HOLLIER MICHAEL PETER ;BRITISH TELECOMM (GB)) 6 January 1994 (1994-01-06) page 1, line 1 -page 3, line 8 page 7, line 14 -page 8, line 23; claims 1-3,22,23,28,30; figure 2 page 11, line 20 -page 13, line 26; figure 1 --- -/--	1-4, 11-13, 16-18

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 January 2001	24/01/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Nilsson, M

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PC[redacted] 00/08884

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 719 028 A (AT & T CORP) 26 June 1996 (1996-06-26)	5,6
A	column 1, line 45 -column 2, line 30 column 3, line 14 - line 44; claims 1,2; figure 1 column 6, line 35 -column 7, line 15; figure 10	1,12,17
A	WO 99 39453 A (KONINKL PHILIPS ELECTRONICS NV ;PHILIPS AB (SE)) 5 August 1999 (1999-08-05) abstract page 1, line 19 -page 2, line 12; figure 2 page 4, line 11 - line 30; claims 1-5,10	1,12,17

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PC[redacted] 00/08884

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9715124 A	24-04-1997	SE 505150 C	07-07-1997
		AU 710224 B	16-09-1999
		AU 7353596 A	07-05-1997
		BR 9610968 A	02-03-1999
		CA 2233679 A	24-04-1997
		CN 1200210 A	25-11-1998
		EP 0856213 A	05-08-1998
		JP 11514516 T	07-12-1999
		NO 981713 A	02-06-1998
		SE 9503640 A	19-04-1997
WO 9400922 A	06-01-1994	AU 670950 B	08-08-1996
		AU 4350093 A	24-01-1994
		CA 2137005 A	06-01-1994
		DE 69321590 D	19-11-1998
		DE 69321590 T	01-04-1999
		EP 0647375 A	12-04-1995
		EP 0856961 A	05-08-1998
		ES 2122021 T	16-12-1998
		JP 8501910 T	27-02-1996
		SG 48927 A	18-05-1998
		US 5621854 A	15-04-1997
		AU 677401 B	24-04-1997
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		JP 8511672 T	03-12-1996
		SG 47542 A	17-04-1998
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EP 0719028 A	26-06-1996	US 5548642 A	20-08-1996
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		SG 52194 A	28-09-1998
WO 9939453 A	05-08-1999	CN 1262818 T	09-08-2000
		EP 0972357 A	19-01-2000

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JC13 PCT/PTO 26 FEB 2002

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B.D.
6-15-02

European Patent Office
Directorate General 2
D-80298 Munchen
Duitsland

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Your reference	Your letter of	Our reference	Telephone
PCT/EP00/08884	October 12, 2001	402582WO	+31 70 4460678

Enclosure(s)
2

Date
October 22, 2001

Subject PCT/EP00/08884

Dear Sirs,

This is to respond to the Written Opinion, dated 12.10.2001, in the International Preliminary Examination of the above-identified patent application.

Please, find enclosed (in 3-fold) substitute sheets for the present pages 9,-,12, containing Amended Claims 1, 12 and 17 in order to replace present Claims 1, 12 and 17.

Please, find further enclosed a copy of the amended set of claims as compared with the originally filed set of claims, in which the amendments have been marked.

The amendments in Claims 12 and 17 are in accordance with the "certain observations" made by the Examiner in section Re Item VIII of the present Written Opinion. It appeared that in present Claim 1 (in lines 9-13 of page 9) a similar amendment was needed as to maintain suitable correspondence with Claim 12 now amended.

Now applicant looks forward to a positive Preliminary Examination Report.

The professional representative,

K.M. Nuyts

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VATnr. NL008849225B0

10/069704
JC13 Rec'd PCT/PTO 26 FEB 2002

F. CLAIMS

1. Method for measuring a talking quality of a telephone link in a telecommunications network,
characterised by the following steps:
- combining, by means of combining means (34), a talker speech signal (s(t)) and a signal (r(t)), which occurred in a return channel of the telephone link as a consequence of the transmission of the talker speech signal in a forward channel of the telephone link, to a combined speech signal (s'(t)), and
- subjecting the combined speech signal with respect to the talker speech signal to an objective measurement technique (32) for measuring a perceptual quality of speech signals, and
- producing an output signal (q(t)) which represents an estimated value concerning the talking quality.

2. Method according to claim 1, characterised in that the combining step comprises a signal addition of the returned signal and the talker speech signal in the electrical domain.

3. Method according to claim 2, characterised in that the signal addition is preceded by an inverse filtering of either the returned signal, or the talker speech signal.

4. Method according to claim 2 or 3, characterised in that the returned signal (e4) is taken off from a two-wire part (23) of the telephone link.

5. Method according to claim 2 or 3, characterised in that the returned signal (e2, e3) is taken off from a four-wire part (28) of the telephone link.

6. Method according to claim 1, characterised in the combining step comprises a signal combination of the returned signal and the talker speech signal in the acoustical domain.

7. Method according to claim 6, characterised in that the talker speech signal (s) and the returned signal (e5) are combined by means of a microphone, which is additional to the microphone in a telephone set (21) and located near an ear of a talking user of the telephone set.

8. Method according to any of the claims 1,-,7, characterised in that the talker speech signal and the returned signal are taken off from an established telephone link.

9. Method according to claim 8, characterised in that the produced output signal of the objective measurement (42) is fed to a control input (52) of an echo-minimising device (46) included in the established telephone link.

10. Method according to claim 9, characterised in that the output signal of the objective measurement is fed to a monitoring system (F, G).

11. Method according to any of the claims 1,-,7, characterised in that the talker speech signal, and either the combined signal or the returned signal are signals laid down in a data base.

12. Device for measuring a talking quality of a telephone link in a telecommunications network (30; 40), the device comprising measurement means (32; 42) for an objective measuring of a perceptual quality of speech signals, the measuring means being provided with:

- a first input port (33; 47) for receiving a first speech signal (s(t); s) transmitted or to be transmitted via a forward channel of the telephone link,
- a second input port (35; 48) for receiving a second speech signal (s'(t); s'), which is a function of the first speech signal affected in the telecommunications network,
- an output port (36; 50) for an output signal representing an estimated value of the perceptual quality of the second speech signal with respect to the first speech signal,

characterised in that

the device additionally comprises signal combination means (34; 49) for combining the first speech signal (s(t); s) and a third speech signal (r(t); e), thereby generating the second speech signal (s'(t); s'), the first and third speech signal being respectively a talker speech signal and a signal which occurred in a return channel (24, 28, 23; 45, 41) of the telephone link as a consequence of the transmission of the talker speech signal in a forward channel (23, 27, 24; 41, 44) of the telephone link, and the output signal representing an estimated value concerning the talking quality.

13. Device according to claim 12, characterised in that the signal combination means comprise a signal adder.

14. Device according to claim 12 or 13, characterised in that the signal combination means (49) are provided with first (49.1) and second (49.2) signal inputs, which are coupled to the forward channel (44) and the return channel (45) of an established telephone link, respectively, and that the first input port (47) of the measurement means (42) is coupled to the forward channel, and the second input port (48) of the measurement means is coupled to the signal output of the signal-combination means (49).

15. Device according to claim 14, characterised in that the output port (50) is coupled to a control input (52) of an echo-minimising device (46) included in the established telephone link.

16. Device according to claim 12 or 13, characterised in that the first and the second input ports are coupled to a data base of speech signals, on which the first speech signal, and either the second speech signal or the echo signal, are laid down.

17. Telephone-link circuit for a telephone link in a telecommunications network, comprising a forward channel (41, 44) and a return channel (45, 41), and an echo-minimising device (46) included between the forward channel and the return channel,
characterised in that
the telephone-link circuit further comprises:

- a signal combiner (49) provided with first and second signal inputs (49.1, 49.2), which are coupled to the forward channel (44) and the return channel (45) of a telephone link, respectively, and with a signal output (49.3), and
- an objective measurement device (42) provided with a first input port (47) coupled to the forward channel (44) and a second input port (48) coupled to the output (49.3) of the signal combiner (49), and an output port (50), for processing a first speech signal received on the first input port, and with a second speech signal received on the second input port, and for producing an output signal on the output port, said output signal representing an estimated value concerning the talking quality.

18. Telephone-link circuit according to claim 17, characterised in that the output port (50) of the measurement device has a signal coupling with a control input (52) of the echo-minimising device (46).

19. Telephone-link circuit according to claim 17 or 18, characterised in that there is further provided for a detection device (53) for detecting the speech status over the established telephone link, and for a switch (51) included in the signal coupling with the control input (52), the switch being controlled by the detection device.

20. Telephone-link circuit according to any of the claims 17, 18 or 19, characterised in that the output port (50) of the measurement device has a signal coupling (F, G) with a monitoring system.

F. CLAIMS

1. Method for measuring a talking quality of a telephone link in a telecommunications network,
characterised by the following steps:
- combining, by means of combining means (34), a talker speech signal (s(t)) and a ~~corresponding returned~~ signal ~~(r(t))~~ (r(t)), ~~to a combined speech signal (s'(t)), the returned signal being a signal~~ which occurred in a return channel of the telephone link as a consequence of the transmission of the talker speech signal in a forward channel of the telephone link, to a combined speech signal (s'(t)), and
- subjecting the combined speech signal with respect to the talker speech signal to an objective measurement technique (32) for measuring a perceptual quality of speech signals, and
- producing an output signal (q(t)) which represents an estimated value concerning the talking quality.

2. Method according to claim 1, characterised in that the combining step comprises a signal addition of the returned signal and the talker speech signal in the electrical domain.

3. Method according to claim 2, characterised in that the signal addition is preceded by an inverse filtering of either the returned signal, or the talker speech signal.

4. Method according to claim 2 or 3, characterised in that the returned signal (e4) is taken off from a two-wire part (23) of the telephone link.

5. Method according to claim 2 or 3, characterised in that the returned signal (e2, e3) is taken off from a four-wire part (28) of the telephone link.

6. Method according to claim 1, characterised in the combining step comprises a signal combination of the returned signal and the talker speech signal in the acoustical domain.

7. Method according to claim 6, characterised in that the talker speech signal (s) and the returned signal (e5) are combined by means of a microphone, which is additional to the microphone in a telephone set (21) and located near an ear of a talking user of the telephone set.

8. Method according to any of the claims 1,-,7, characterised in that the talker speech signal and the returned signal are taken off from an established telephone link.

9. Method according to claim 8, characterised in that the produced output signal of the objective measurement (42) is fed to a control input (52) of an echo-minimising device (46) included in the established telephone link.

10. Method according to claim 9, characterised in that the output signal of the objective measurement is fed to a monitoring system (F, G).

11. Method according to any of the claims 1,-,7, characterised in that the talker speech signal, and either the combined signal or the returned signal are signals laid down in a data base.

12. Device for measuring a talking quality of a telephone link in a telecommunications network (30; 40), the device comprising measurement means (32; 42) for an objective measuring of a perceptual quality of speech signals, the measuring means being provided with:

- a first input port (33; 47) for receiving a first speech signal (s(t); s) transmitted or to be transmitted via a forward channel of the telephone link,
- a second input port (35; 48) for receiving a second speech signal (s'(t); s'), which is a function of the first speech signal affected in the telecommunications network,
- an output port (36; 50) for an output signal representing an estimated value of the perceptual quality of the second speech signal with respect to the first speech signal,

characterised in that

the device additionally comprises signal combination means (34; 49) for combining the first speech signal (s(t); s) and a third speech signal (r(t); e), thereby generating the second speech signal (s'(t); s'), the first and third speech signal being respectively a talker

speech signal and ~~a corresponding returned signal, respectively, the returned signal being~~ a signal which occurred in a return channel (24, 28, 23; 45, 41) of the telephone link as a consequence of the transmission of the talker speech signal in a forward channel (23, 27, 24; 41, 44) of the telephone link, and the output signal representing an estimated value concerning the talking quality.

13. Device according to claim 12, characterised in that the signal combination means comprise a signal adder.

14. Device according to claim 12 or 13, characterised in that the signal combination means (49) are provided with first (49.1) and second (49.2) signal inputs, which are coupled to the forward channel (44) and the return channel (45) of an established telephone link, respectively, and that the first input port (47) of the measurement means (42) is coupled to the forward channel, and the second input port (48) of the measurement means is coupled to the signal output of the signal-combination means (49).

15. Device according to claim 14, characterised in that the output port (50) is coupled to a control input (52) of an echo-minimising device (46) included in the established telephone link.

16. Device according to claim 12 or 13, characterised in that the first and the second input ports are coupled to a data base of speech signals, on which the first speech signal, and either the second speech signal or the echo signal, are laid down.

17. Telephone-link circuit for a telephone link in a telecommunications network, comprising a forward channel (41, 44) and a return channel (45, 41), and an echo-minimising device (46) included between the forward channel and the return channel,
characterised in that
the telephone-link circuit further comprises:

- a signal combiner (49) provided with first and second signal inputs (49.1, 49.2), which are coupled to the forward channel (44) and the return channel (45) of a telephone link, respectively, and with a signal output (49.3), and
- an objective measurement device (42) provided with a first input port (47) coupled to the forward channel (44) and a second input

port (48) coupled to the output (49.3) of the signal combiner (49), and an output port (50), for processing a first speech signal received on the first input port, and with a second speech signal received on the second input port, and for producing an output signal on the output port, said output signal representing an estimated value concerning the talking quality.

18. Telephone-link circuit according to claim 17, characterised in that the output port (50) of the measurement device has a signal coupling with a control input (52) of the echo-minimising device (46).

19. Telephone-link circuit according to claim 17 or 18, characterised in that there is further provided for a detection device (53) for detecting the speech status over the established telephone link, and for a switch (51) included in the signal coupling with the control input (52), the switch being controlled by the detection device.

20. Telephone-link circuit according to any of the claims 17, 18 or 19, characterised in that the output port (50) of the measurement device has a signal coupling (F, G) with a monitoring system.

(12) INTERNATIONAL AP[illegible]ATION PUBLISHED UNDER THE PATE[illegible]OPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 March 2001 (22.03.2001)

PCT

(10) International Publication Number
WO 01/20804 A1

(51) International Patent Classification[7]: H04B 3/46, 3/23

(21) International Application Number: PCT/EP00/08884

(22) International Filing Date:
8 September 2000 (08.09.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1013044 15 September 1999 (15.09.1999) NL

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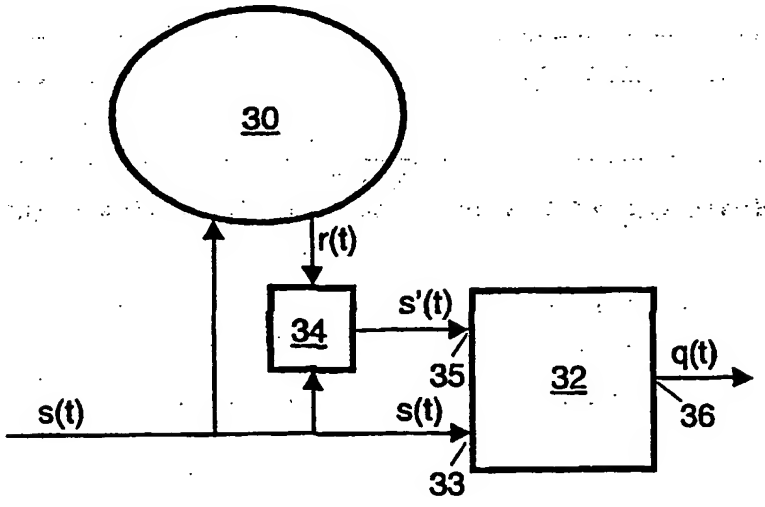
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*
— *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: MEASURING THE PERCEPTUAL QUALITY OF SPEECH SIGNALS INCLUDING ECHO DISTURBANCES



(57) Abstract: For measuring the influence of echo on the perceptual quality on the talker's side of a telephone link in a telecommunications network, a talker speech signal (s(t)) and a combined signal (s'(t)) are fed to an objective measurement device (32), such as a PSQM system, for obtaining an output signal (q(t)) representing an estimated value of the perceptual quality. The combined signal is obtained in a signal combiner (34) by signal combination of a returned signal (r(t)) originating from the network and corresponding to the speech signal, and the speech signal (s(t)). The measuring method is applicable to speech signals laid down in a data base, but also to signals directly obtained from a telephone-link circuit, the output signal being fed to a quality-control system and/or to an echo-minimising device.

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Measuring the perceptual quality of speech signals including echo disturbances.

A. BACKGROUND OF THE INVENTION

1. Field of the invention

The invention lies in the area of measuring the quality of telephone links in telecommunications systems. More in particular, it concerns measuring the influence of echo disturbances and sidetone distortions on the perceptual quality of a telephone link in a telecommunications system as subjectively observed by a talker during a telephone call.

2. Prior art

Echo is a significant factor in the perceptual quality of an end-to-end telephone link during a telephone call. The influence of said factor on the perception may be quantified by measuring the combination of a pair of parameters known by the indications "talker echo loudness rating" and "round-trip delay", such as defined, e.g., in the Recommendation G.107 of ITU-T (Reference [1]; for more bibliographical details relating to the references, see below under D.). For a non-intrusive measurement for determining such parameters, ITU-T Recommendation P.561 (see Reference [2]) provides recommendations. Said known technique, however, has the following drawbacks. To measure the influence of the echo disturbance, first of all a correlation technique is required to determine the delay of the echo. Furthermore, a specific algorithm is required for estimating the "talker echo loudness rating". Moreover, determining the echo delay is difficult when the echo signals are of a low level, i.e., when they are located near the limit of perceptibility, as often is the case with speech on high-quality telephone links. Even if a correct estimate is made of the delay and the loudness, even then the differences in perception of the echo disturbance between different talkers are not capable of being measured, since during the measurement no details of the speech signal can be taken into account. Furthermore effects caused by a distortion of the sidetone signal cannot be taken into account either. Therefore, the known technique shows up only a moderate correlation between the objective measurement results and the more subjective findings of the talkers, particularly in the event of slight echo disturbances and/or sidetone distortions.

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In fact, in the event of echo on a telephone link between an A subscriber and a B subscriber, a distinction must be made between a so-called talker echo (from A to A) which the talker at the transmission side (A) may experience during conversation, and a listener echo, which the listener at the receiving side (B) may experience while listening. The perception of the influence on the listener of the listener echo, which in fact consists of twice-reflected speech signals, may basically be quantified using a so-called objective measurement technique, such as the Perceptual Speech Quality Measure (PSQM). With said known technique (see, e.g., references [3] and [4]), which models the perceptual properties of human hearing, the listening quality of a one-way speech signal over a telephone link may be predicted. Quantifying the influence of echo and/or sidetone distortion on the perception of the talker using said technique, i.e. measuring the talking quality, however, is not known and not possible just like that, but it is desirable.

A third factor in the quality of telephony systems is the so-called interaction quality, largely determined by the delays in such systems. The interaction quality together with the listening quality and the talking quality determines an overall quality, called conversational quality, of a telephony service.

References [6], [7] and [8] disclose telephone-link circuits which include echo-minimising devices, such as echo cancelors and echo suppressors, for various kinds of echo, such as acoustic echo caused by acoustic reflections in a teleconferencing room of a teleconferencing system (reference [6]), a so-called electrical echo caused in a four-to-two wire conversion in a PSTN/subscriber interface (reference [7] and [8]), and an acoustical/mechanical type of echo caused in the acoustical and mechanical coupling of the loudspeaker and the microphone in a telephone (hand)set (reference [8]). Such echo-minimising devices are usually applied as near as possible to the origin of the echo signal in question in the telecommunication network. A perceptual quality measurement of any talking quality as indicated above is not disclosed at all.

B. SUMMARY OF THE INVENTION

The object of the invention is to provide for a method and a device for measuring the talking quality, i.e. the influence of returned signals such as echo and/or sidetone distortion on the perceptual quality on the part of the talker of a telephone link in a

telecommunications network, which both does not possess said drawbacks of the known technique and accommodates said desire.

A further object of the invention is to provide for a telephone-link circuit in which the method and the device are applied.

A method for measuring the talking quality of a telephone link in a telecommunications network according to the preamble of claim 1, according to the invention is characterised as in claim 1.

A device for measuring the talking quality of a telephone link in a telecommunications network according to the preamble of claim 12, for the definition of which reference [4] was applied, according to the invention is characterised as in claim 12.

The invention is based on the insight that a talking telephone user simultaneously listens and therefore hears his own speech signal simultaneously with an echo of his speech and any other signals possibly returning from the headphone of the telephone set. Therefore, the application of an original speech signal, i.e. a talker speech signal, and a combined signal, composed of the original talker speech signal and a corresponding returned signal, as input signals for an objective perceptual quality measurement technique of speech signals, such as PSQM, may lead to a usable estimate of the talking quality, whereas such is not the case if only the original talker speech signal and the corresponding echo or any other corresponding returned signal are used. In this way any distortions in either the echo or the sidetone can also be taken into account in the prediction of the talking quality.

A telephone-link circuit for a telephone link in a telecommunications network, comprising a forward channel and a return channel, and an echo-minimising device included between the forward channel and the return channel, for the definition of which reference [8] was applied, according to the invention is characterised as in claim 17.

Further preferred embodiments of the method, the device and the telephone-link circuit of the invention are summarised in the various subclaims.

C. REFERENCES

[1] ITU-T Recommendation G.107: The E-model, a computational model for use in transmission planning, December 1998;

[2] ITU-T Recommendation P.561: In-service, non-intrusive measurement device - voice service measurements, February 1996;

[3] J.B. Beerends and J.A. Stemerdink, A perceptual speech quality measure based on a psychoacoustic sound representation. J. Audio Eng. Soc. 42:115-123, March 1994;

[4] ITU-T Recommendation P.861: Objective quality measurement of telephone band (300-3400 Hz) speech codecs, August 1996;

[5] WO 94/00922;

[6] EP-A-0719028;

[7] WO 97/15124;

[8] WO 99/13596.

All references are considered to be incorporated into the present application.

D. BRIEF DESCRIPTION OF THE DRAWING

The invention will be further explained by means of the description of exemplary embodiments, reference being made to a drawing comprising the following figures:

FIG. 1 schematically shows a known method for measuring the perceptual quality of a speech signal;

FIG. 2 schematically shows a telephone link in a telecommunications network;

FIG. 3 schematically shows a method according to the invention;

FIG. 4 shows part of a telephone-link circuit in which the invention is applied.

E. DESCRIPTION OF EXEMPLARY EMBODIMENTS

FIG. 1 shows a known schematical setup of an application of an objective measurement technique, such as, e.g., the one based on a model of the human hearing and which is usually designated by PSQM, for estimating the perceptual quality of speech over telephone links. It comprises a system or telecommunications network under test 10, hereinafter referred to as network 10 for briefness' sake, and a system 12 for the perceptual analysis of speech signals offered, hereinafter designated, for briefness' sake only, by PSQM system 12. A speech signal d(t) is used, on the one hand, as an input signal of the network 10 and, on the other hand, as a first input signal of the PSQM system 12. An output signal d'(t) of the network 10, which in fact is the speech signal d(t) affected by the network 10, is used as a second input signal of the PSQM system 12. An output signal p(t) of the PSQM system 12 represents an estimate of the perceptual quality of the speech link through the network 10. Since the input

end and the output end of a speech link, particularly in the event it runs through a telecommunications network, are remote, for the input signals of the PSQM system use is made in most cases of speech signals stored on data bases. Here, as is customary, speech signal is understood to mean each sound basically perceptible to the human hearing, such as speech and tones. The system or network being tested may of course also be a simulation system, which simulates a telecommunications network. With this known technique, reliable estimates of the perceptual quality are possible.

FIG. 2 schematically shows a telephone link established between an A subscriber and a B subscriber of a telecommunications network 20. Telephone sets 21 and 22 of the A subscriber and the B subscriber, respectively, are connected by way of two-wire connections 23 and 24 and four-wire interfaces, namely, hybrids 25 and 26, to the network 20. Through the network, the established telephone link has a forward channel including a two-wire part, i.c. two-wire connections 23 and 24, and a four-wire part 27, over which speech signals from the A subscriber are conducted, and a return channel including a two-wire part, i.c. two-wire connections 24 and 23, and a four-wire part 28, over which speech signals from the B subscriber are conducted. An acoustical speech signal s striking the microphone M of the telephone set 21 of the A subscriber, is passed on, by way of the forward channel (23, 27, 24) of the telephone link, to the earphone R of telephone set 22, and becomes audible there for the B subscriber as an acoustical speech signal s" affected by the network. Each speech signal s(t) on the forward channel generally causes a returned signal r(t) which, particularly due to the presence of said hybrids, includes an electrical type of echo signal on the return channel (28, 23) of the telephone link, and this is passed on to the earphone R of the telephone set 21, and may therefore disturb the A subscriber there. Furthermore the acoustic and/or mechanical coupling of the earphone or loudspeaker signal to the microphone of the telephone set of the B subscriber may cause an acoustic type of echo signal back to the telephone set of the A subscriber, which contributes to the returned signal. In an end-to-end digital telephone link (such as in a GSM system or in a Voice-over-IP system) such acoustic echo signal is the only type of echo signal that contributes to the return signal.

Summarizing a returned signal r(t) may include, at various stages in the return channel of a telephone link as caused by a speech signal s(t) in the forward channel of the telephone link:

- a signal e1 representing acoustic echo;

- a signal e2 representing an electrical echo possibly in combination with the acoustic echo;

- a signal e3 which represents the signal e2 as affected, i.e. delayed or distorted, by the network 20;

- a signal e4 which represents the signal e3 in combination with a sidetone signal, and

- a signal e5 which is an acoustic equivalent of the signal e4.

To restrict echo effects in returned signals such as represented by the signals e1 and e2 to a minimum, it is generally customary to include, in telephone-link circuits, echo suppressors or echo cancellers, one at each end of a telephone link. Using the signals present in the forward and return channels, an echo suppressor or canceller continuously makes an estimate of the echo signal and subtracts it from the signal in the return channel. Such an estimate, however, cannot always be carried out reliably, which is particularly the case on high-quality speech links, where the echo signals are at the audibility limit. The optimisation routines applied within such echo suppressors or cancellers do not always provide the best result concerning the perception. Should such optimisation routines be based, at least in part, on the method described below with reference to FIG. 3, then an optimum result having a minimally perceptible echo is possible.

FIG. 3 shows a schematic setup according to the invention, for obtaining an estimate of the perceptual talking quality of a telephone link, for a telephone user when talking on his own telephone set. In a similar manner as the setup of FIG. 1, the setup of FIG. 3 comprises a system or telecommunications network under test 30, hereinafter for briefness' sake referred to as network 30, and a system 32 for the perceptual analysis of speech signals offered, hereinafter for briefness' sake only designated as PSQM system 32. Any talker speech signal s(t) is used, on the one hand, as an input signal of the network 30 and, on the other hand, as first input signal of the PSQM system 32. A returned signal r(t) obtained from the network 30, which corresponds to the input talker speech signal s(t), is combined, in a combination circuit 34, with the talker speech signal s(t) to provide a combined speech signal s'(t), which is then used as a second input signal of the PSQM system. If necessary, the signal s(t) is scaled to the correct level before being combined with the returned signal r(t) in the combination circuit. An output signal q(t) of the PSQM system 32 represents an

estimate of the talking quality, i.e. of the perceptual quality of the telephone link through the network 30 as it is experienced by the telephone user during talking on his own telephone set. Here, too, use may again be made of signals stored on data bases. These may be obtained, e.g., from the telephone set (such as signal e4 in the electrical domain or signal e5 in the acoustic domain) of the A subscriber in the event of an established link during speech silence of the B subscriber. The hybrid between the telephone subscriber access point and the four-wire interface with the network does not, or hardly, contribute to the echo component in the returned signal r(t) (of course, it does contribute to the echo component in a returned signal occurring in the return channel of the B subscriber of the telephone link). However, any such signal contribution has a short delay and, as a matter of fact, forms part of the sidetone.

The signals s(t) and r(t) may also be tapped off from a four-wire part 27 of the forward channel and the four-wire part 28 of the return channel near the four-wire interface 25, respectively. This offers the opportunity of a permanent measurement of the perceptual quality in the event of established telephone links. For this purpose, FIG. 4 schematically shows an embodiment.

FIG. 4 shows, in a similar manner as part of FIG. 2, a two-wire connection 41 which, by way of a four-wire interface, in this case hybrid 43, and of four-wire connection parts 44 and 45, is connected to a telecommunications network 40. Through the network an established telephone link may be set up having a forward channel via the two-wire connection 41 and the four-wire connection part 44 and a return channel via the four-wire connection part 45 and the two-wire connection 41. The line circuit belonging to the telephone link includes an echo canceller 46. Also included is a PSQM system 42, of which a first input port 47 is coupled to the four-wire part 44 of the forward channel, and a second input port 48 is coupled to an output port 49.3 of a signal combiner 49 having two input ports 49.1 and 49.2 which are coupled to the four-wire part 44 of the forward channel and the four-wire part 45 of the return channel, respectively. An output port 50 of the PSQM system 42 for quality-control purposes may be coupled directly, or by way of a switch 51 (arrows F and G), to a monitoring system (not shown). In addition the output port 50, as shown, may be coupled, by way of the switch 51, to a control input 52 of the echo canceller 46. The switch 51 is preferably controlled by a control signal given off by a detection circuit 53 (constructed, e.g., as a "double-talk" detection circuit

known per se), which is coupled to the return channel for detecting the speech status on the four-wire part 45 of the return channel, such as, e.g., speech silence on the part of the B subscriber. Thus, the estimated signal becoming available by way of the output port 50 of the PSQM system may be used, on the one hand, for all kinds of quality-control purposes and, on the other hand, may be used directly in echo-minimising equipment.

In the most simple embodiments, the combination circuit 34 and the signal combiner 49 are signal adders. When applying the method and the device in practice, in the signal combiner carrying out the adding function (addition) is preferably preceded by the so-called "inversely filtering" of one of the signal components. The inverse filter applied there generates a linear estimate of the echo path, and to a major degree contributes towards achieving a high correlation between an objective measurement and a subjective observation.

In a further embodiment, the signal combination of the speech signal s(t) and the returned signal r(t) is carried out in the acoustical domain, e.g. by recording the relevant acoustical signals by means of one or more additional microphones, to the one used in the telephone handset, near one or both ears of the talking user. In its simplest form the acoustical signal at the non-telephone ear is used as a first input to the PSQM system while the acoustical signal at the telephone ear is used as the second input signal to the PSQM system. In case a so-called head-and-torso-simulator (HATS) is used, the microphones located in the artificial ears of such a HATS can be used. In case only a single microphone is used the first input signal to the PSQM system can be recorded from the acoustic domain using a reference telephone handset while the second input signal to the PSQM system can be recorded from the acoustic domain using the telephone handset with the network under test. (WEGLATEN In this case both recordings contain the same natural acoustical sidetone that can be used to align the non-simultaneously recorded signals.)

F. CLAIMS

1. Method for measuring a talking quality of a telephone link in a telecommunications network,
characterised by the following steps:
- combining, by means of combining means (34), a talker speech signal (s(t)) and a corresponding returned signal (r(t)) to a combined speech signal (s'(t)), the returned signal being a signal which occurred in a return channel of the telephone link as a consequence of the transmission of the talker speech signal in a forward channel of the telephone link, and
- subjecting the combined speech signal with respect to the talker speech signal to an objective measurement technique (32) for measuring a perceptual quality of speech signals, and
- producing an output signal (q(t)) which represents an estimated value concerning the talking quality.

2. Method according to claim 1, characterised in that the combining step comprises a signal addition of the returned signal and the talker speech signal in the electrical domain.

3. Method according to claim 2, characterised in that the signal addition is preceded by an inverse filtering of either the returned signal, or the talker speech signal.

4. Method according to claim 2 or 3, characterised in that the returned signal (e4) is taken off from a two-wire part (23) of the telephone link.

5. Method according to claim 2 or 3, characterised in that the returned signal (e2, e3) is taken off from a four-wire part (28) of the telephone link.

6. Method according to claim 1, characterised in the combining step comprises a signal combination of the returned signal and the talker speech signal in the acoustical domain.

7. Method according to claim 6, characterised in that the talker speech signal (s) and the returned signal (e5) are combined by means

of a microphone, which is additional to the microphone in a telephone set (21) and located near an ear of a talking user of the telephone set.

8. Method according to any of the claims 1,-,7, characterised in that the talker speech signal and the returned signal are taken off from an established telephone link.

9. Method according to claim 8, characterised in that the produced output signal of the objective measurement (42) is fed to a control input (52) of an echo-minimising device (46) included in the established telephone link.

10. Method according to claim 9, characterised in that the output signal of the objective measurement is fed to a monitoring system (F, G).

11. Method according to any of the claims 1,-,7, characterised in that the talker speech signal, and either the combined signal or the returned signal are signals laid down in a data base.

12. Device for measuring a talking quality of a telephone link in a telecommunications network (30; 40), the device comprising measurement means (32; 42) for an objective measuring of a perceptual quality of speech signals, the measuring means being provided with:

- a first input port (33; 47) for receiving a first speech signal (s(t); s) transmitted or to be transmitted via a forward channel of the telephone link,
- a second input port (35; 48) for receiving a second speech signal (s'(t); s'), which is a function of the first speech signal affected in the telecommunications network,
- an output port (36; 50) for an output signal representing an estimated value of the perceptual quality of the second speech signal with respect to the first speech signal,

characterised in that

the device additionally comprises signal combination means (34; 49) for combining the first speech signal (s(t); s) and a third speech signal (r(t); e), thereby generating the second speech signal (s'(t); s'), the first and third speech signal being a talker speech signal and a corresponding returned signal, respectively, the returned signal being a signal which occurred in a return channel (24, 28, 23; 45, 41)

or the telephone link as a consequence of the transmission of the talker speech signal in a forward channel (23, 27, 24; 41, 44) of the telephone link, and the output signal representing an estimated value concerning the talking quality.

13. Device according to claim 12, characterised in that the signal combination means comprise a signal adder.

14. Device according to claim 12 or 13, characterised in that the signal combination means (49) are provided with first (49.1) and second (49.2) signal inputs, which are coupled to the forward channel (44) and the return channel (45) of an established telephone link, respectively, and that the first input port (47) of the measurement means (42) is coupled to the forward channel, and the second input port (48) of the measurement means is coupled to the signal output of the signal-combination means (49).

15. Device according to claim 14, characterised in that the output port (50) is coupled to a control input (52) of an echo-minimising device (46) included in the established telephone link.

16. Device according to claim 12 or 13, characterised in that the first and the second input ports are coupled to a data base of speech signals, on which the first speech signal, and either the second speech signal or the echo signal, are laid down.

17. Telephone-link circuit for a telephone link in a telecommunications network, comprising a forward channel (41, 44) and a return channel (45, 41), and an echo-minimising device (46) included between the forward channel and the return channel, characterised in that
the telephone-link circuit further comprises:
- a signal combiner (49) provided with first and second signal inputs (49.1, 49.2), which are coupled to the forward channel (44) and the return channel (45) of a telephone link, respectively, and with a signal output (49.3), and
- an objective measurement device (42) provided with a first input port (47) coupled to the forward channel (44) and a second input port (48) coupled to the output (49.3) of the signal combiner (49), and an output port (50), for processing a first speech signal received on the first input port, and with a

second speech signal received on the second input port, and for producing an output signal on the output port.

18. Telephone-link circuit according to claim 17, characterised in that the output port (50) of the measurement device has a signal coupling with a control input (52) of the echo-minimising device (46).

19. Telephone-link circuit according to claim 17 or 18, characterised in that there is further provided for a detection device (53) for detecting the speech status over the established telephone link, and for a switch (51) included in the signal coupling with the control input (52), the switch being controlled by the detection device.

20. Telephone-link circuit according to any of the claims 17, 18 or 19, characterised in that the output port (50) of the measurement device has a signal coupling (F, G) with a monitoring system.

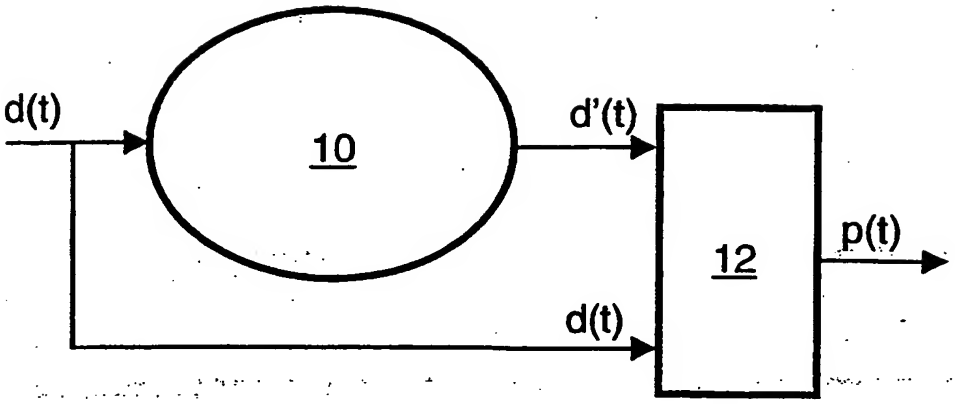
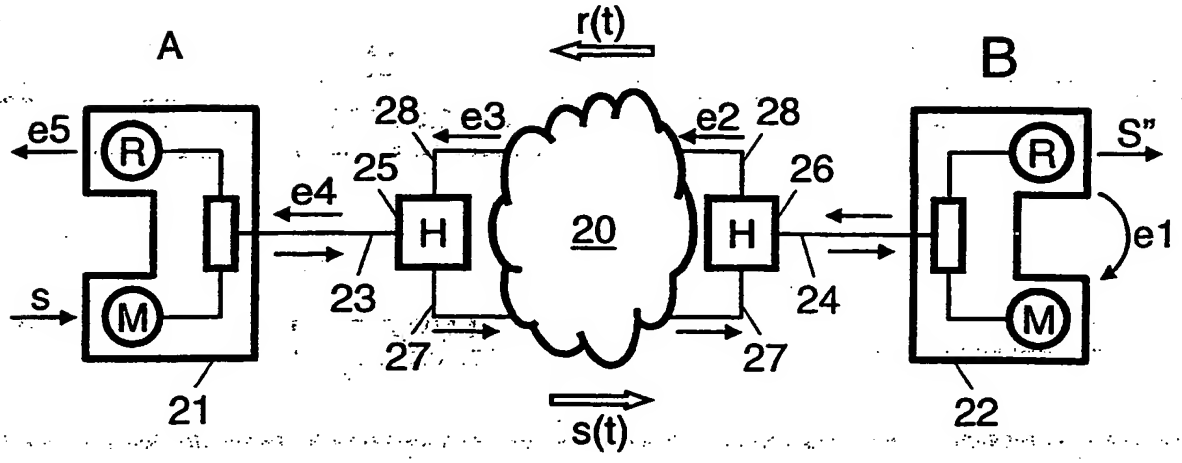

d(t)
10
d'(t)
12
p(t)
d(t)

FIG. 1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R
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e2
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27
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s(t)
22

FIG. 2

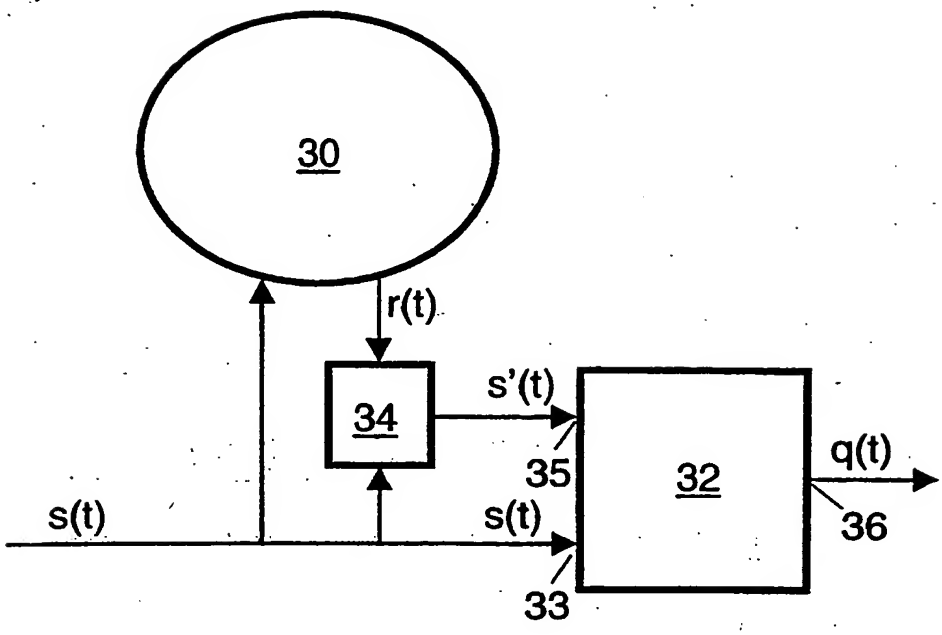
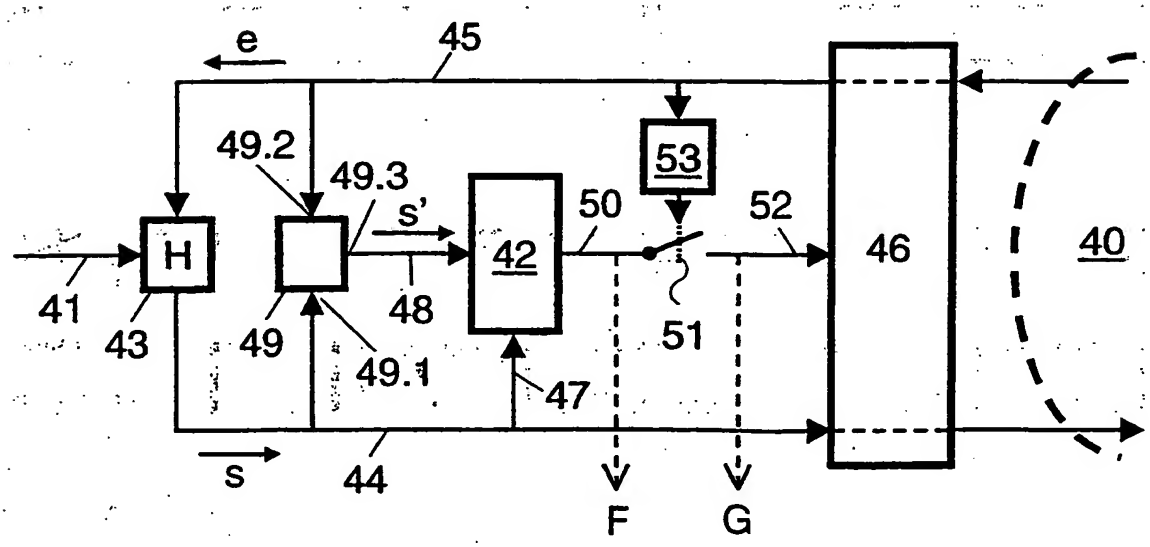

30
r(t)
34
s'(t)
35
32
q(t)
36
s(t)
s(t)
33

FIG. 3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45
49.2
49.3
s'
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50
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H
42
41
43
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48
49.1
51
47
s
44
F
G

FIG. 4